Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

WARREN COLBURN ON THE TEACHING OF ARITHMETIC TOGETHER WITH AN ANALYSIS OF HIS ARITHMETIC TEXTS[1]

WALTER S. MONROE
The University of Chicago

II. TEACHING OF ARITHMETIC[2]

By Warren Colburn

I have been requested to address the convention on the subject of teaching arithmetic. I have accepted the invitation with extreme diffidence, believing there would be many gentlemen present much more competent to this task than myself. The subject is certainly an important one in every point of view, whether we consider its application to the affairs of life, or its effect as a discipline of the mind, or the time which is usually devoted to it.

With regard to its application, there are very few persons, either male or female, arrived at years of discretion, who have not occasions daily to make use of arithmetic in some form or other in the ordinary routine of business. And the person the most ready in calculation is much the most likely to succeed in business of any kind. As our country becomes more thickly peopled, and competition in the various branches of business becomes greater, and further progress is made in the arts, and new arts are discovered, knowledge of all kinds is brought into requisition; and none more so than that of arithmetic, and the higher branches of mathematics, of which arithmetic is the foundation.

Arithmetic, when properly taught, is acknowledged by all to be very important as a discipline of the mind; so much so that even if it had no practical application which should render it valuable on its own account, it would still be well worth while to bestow a considerable portion of time on it for this purpose alone. This is a very important consideration, though a secondary one compared with its practical utility.

---

[1] This is the second article of a series. The third will appear in an early issue of this journal.

[2] This is an address delivered by Warren Colburn before the American Institute of Instruction in Boston, August, 1830. It was published in the proceedings of that society and is reprinted here by permission.

The fact that the study of arithmetic is allowed to occupy so large a portion of time in all our schools shows sufficiently the degree of importance attached to the subject by all classes of people. And that it does occupy so large a portion of time is another very strong reason for attention to the mode of teaching it, that the time may be employed to the best advantage. As the demand for all kinds of knowledge is increasing, and new branches of learning are almost daily brought within the compass of the ordinary means of education, it becomes highly important that those kinds which require considerable labor for their acquirement should be made to occupy as little time as may be consistently without sacrificing the advantage of learning them well.

It may not seem improper here to introduce a few remarks concerning the relative advantages of the old and new systems of teaching arithmetic. For though most teachers at the present time prefer the new system, and the majority of the community are decidedly in favor of it, yet there are persons, and some whose opinions are entitled to high respect, who strongly object to the new system and give a decided preference to the old. To such we ought at least to be able to give a reason why we prefer the new system.

For this we shall appeal to facts; they are stubborn things, and the side which they favor must prevail. It must be allowed by all that previous to the introduction of the new system fewer persons learned arithmetic than at present. At least, fewer made any considerable progress in it. Very few females pretended to study it at all, and the number of either sex that advanced much beyond the four primary rules was very inconsiderable. And the learner was very seldom found who could give a satisfactory reason for any operation which he performed. The study of it used to be put off to a very late period. Scholars under twelve or thirteen years of age were not considered capable of learning it, and generally they were not capable. Many persons were obliged to leave school before they were old enough to commence the study of it.

At present the study of arithmetic is very general with both sexes and among all classes. It is taught to advantage even to the very youngest scholars in school and made to fill a portion of time which used to be left unoccupied. And most scholars now have a thorough knowledge of arithmetic at an earlier age than it used formerly to be commenced. And scholars who cannot give a satisfactory reason for their operations are now as rare as were formerly those who could.

But perhaps the advocate for the old system will say, "I grant that it was a little more difficult, and on that very account it was a better exercise for the mind, and when it was learned, it was learned more thoroughly." But in this we shall again find the facts on our side. It cannot be pretended that those who did not study it at all had their minds exercised by it; nor can much more be claimed for those who pretended to learn it. In those two classes, we have seen, was comprehended a very large proportion of the scholars. And with regard to the remainder, a very little observation will show that the advantage is in favor of the new system. I believe most teachers who have understood and taught well the new system will give it as their opinion that most scholars who have studied arithmetic well have learned more of other things, and learned them better, than they would have done if they had not studied arithmetic at all or had studied it the old way. And in this class of teachers we shall find a great number who have been successful both on the old and new systems. It will pass for no argument at all, at the present time, for a man, however well skilled in arithmetic he may be himself, to come forward and say, "I have tried your system, and could not succeed with it at all; therefore it is good for nothing." The reply to such a one is, "You have not taken the trouble to understand the system; therefore you have not given it a fair trial." And we are sure that a sufficient number of successful teachers on the new system can be produced to justify such an answer. Those who do not believe that pupils taught by the new system are as ready and expert in the use of figures and in calculation generally as those taught in the old way have only to go into the best schools taught on the two systems and examine for themselves. Unless they will do this, they will not be convinced; and if they do, we do not fear for the result.

We believe also that we have reason on our side as well as facts. By the old system the learner was presented with a rule which told him how to perform certain operations on figures, and when these were done he would have the proper result. But no reason was given for a single step. His first application of his rule was on a set of abstract numbers, so large that he could not reason on them if he had been disposed to do so. And when he had got through and obtained the result, he understood neither what it was nor the use of it. Neither did he know that it was the proper result, but was obliged to rely wholly on the book, or more frequently on the teacher. As he began in the dark, so he continued; and the results of his calculation seemed to be obtained by some magical operation rather than by the inductions of reason.

By the new system the learner commences with practical examples on which the numbers are so small that he can easily reason upon them. And the reference to sensible objects gives him an idea at once of the kind of result which he ought to produce and suggests to him the method of proceeding necessary to obtain it. By this he is thrown immediately upon his own resources, and is compelled to exert his own powers. At the same time he meets with no greater difficulty than he feels himself confident to overcome. In this way every step is accompanied with complete demonstration. Every new example increases his powers and his confidence. And most scholars soon acquire such a habit of thinking and reasoning for themselves that they will not be satisfied with anything which they do not understand in any of their studies.

Instead of studying rules in the book, the reason of which he does not understand, the scholar makes his own rules; and his rules are a generalization of his own reasoning, and in a way agreeable to his own associations.

We conclude, then, that the new system is preferable to the old. We now come to the question, What is the best mode of teaching the new system? This is a question frequently asked and frequently discussed. In the way that the question is usually considered, it does not admit of an answer. It may be briefly stated to be his who teaches the best. But then it will be found to be the best only in his hands. For any other teacher, another method would be better; so that the method must be suited to the teacher; and the teacher again, to be successful, must adapt his method to the scholar. For until mankind are all made to think alike, and act alike, and look alike, it will be worse than useless—it will be absolutely injurious—to endeavor to make them teach alike or learn alike: I mean in the detail. For there are a few general principles, some of which I shall endeavor by and by to explain, which are applicable to all and must be attended to by all who wish to be successful in teaching. The best method for any particular instructor is that by which he can teach the best. It is that which is suited to his particular mode of thinking, to his manners, to his temper and disposition; and generally, also, it will be modified by the character of his school. So that if I am to give an instructor particular directions with regard to teaching, I must see him in his school and see him teach. Then my instructions would not tend to change his manner, but to improve it if it were faulty.

Teachers are very apt to pride themselves upon some plan which they have discovered for keeping up the attention of the scholars, or of directing their attention to some important point, or of making them remember certain things, or of explaining certain difficult subjects, or of exciting emulation among their pupils, and many other things of the like kind—which, they suppose, if it were generally known and adopted, would be a great improvement, not being aware that the thing is peculiarly adapted to themselves, and to themselves only, and that if another person were to attempt the same thing he would fail. Many have felt so much confidence in improvements of this kind, mistaking a particular case in which they have been successful for a general principle, that they have been at the pains to prepare books adapted to those particular modes, with the greatest expectations of success. But such books always fail of general success, not because the methods were not good and successful in the authors' hands, but because others cannot enter into the spirit of them. Such books, if they are not used in precisely the way that the authors intended, cannot be used at all.

By these remarks, however, I would by no means discourage any teacher from communicating his method to others. On the contrary, I would encourage everyone to do it, whatever his methods may be. For though others should not think proper to adopt them exactly, yet they may frequently draw hints from them to improve their own. And the very fact of a teacher's giving so much attention to his own methods as to be able to explain them to others will be very useful to himself, and often the cause of improvement in them. But no one should feel disappointed because others do not adopt his plans; neither should he despise the plans of others, though he does not choose to adopt them himself.

Without giving any very particular directions with regard to modes of teaching, I will state a few general principles that will apply to almost all modes; and whoever will pursue his own mode according to them, will teach successfully. Most of them are applicable to all other subjects as well as to arithmetic. And, if in the course of the lectures, you may have heard them from others, or may hear them hereafter—which I dare say will be the case—they will not be injured by the repetition.

The first precept which I shall enjoin upon you is to teach but one thing at a time. This is a grand point in arithmetic and in all other branches. Select the principle which you intend to teach the pupil, and apply yourself strictly and exclusively to that, until he is master of it. For as certainly as you endeavor to fix upon his mind two or more things at once, you distract his attention and blend the things together in his mind, so that he does not get a distinct idea of either; and neither of them will be learned well. In teaching any one point, therefore, all others should be kept entirely out of sight, except those which he already knows. These may be referred to at any time for illustration, or for showing the connection. Be sure that the pupil is master of the principle before he is allowed to leave it, let it require what time it will, unless he becomes weary of it and his mind gets confused; in which case, leave it entirely for the present, and take it up afresh at some other time. If the learner is allowed to pass from one point to another when the first is but partially learned, he soon acquires a habit of learning things imperfectly, which it is very difficult afterward to break up. It begets habits of inattention, of thinking loosely and carelessly, and of not fixing anything in his mind as it should be.

And if the teacher thinks to remedy this evil by constantly calling up those things which have been poorly learned, he will find himself disappointed; for he will only confirm the habit instead of curing it.

Almost every instructor succeeds in teaching some things, and almost everyone partially fails in some things; that is, there are some things which he does not teach to his own satisfaction. If he will refer to them, he will perceive that in those things in which he does succeed, his scholars are made thorough as they proceed; and that he is in the habit of seizing the important points, and keeping them distinct, both in his own mind and in the minds of his pupils. But in those things in which he does not succeed, he lets them pass from step to step, without becoming perfect in any of them, and he is probably endeavoring to make up the deficiency by a constant repetition of the things which they have so passed. With many teachers, English grammar would be a familiar illustration of the latter mode of proceeding. The old method of teaching grammar was very faulty in this respect. The learner was first required to commit the grammar to memory, without understanding it at all, or being expected to understand it. And then he was put to parsing all parts of speech at once. Of the success of that mode many of you, I dare say, are able to judge from experience in learning, if not in teaching by it. Many persons still find the subject a difficult one to teach, and the difficulty will generally be found to arise chiefly from the fault I have been speaking of; that is, of endeavoring to teach too many things at once.

In arithmetic this difficulty does not happen exactly in the same way, though in this it is very likely to happen. In grammar, teachers frequently endeavor purposely to teach several things at once; but in arithmetic they do not do it intentionally. They endeavor to teach only one thing at a time; but they are in too great haste to get along, and they do not make their scholars perfect in one thing before they let them pass to another. Hence there is necessarily a reference to what is past while what is past is still imperfectly understood, and the scholar is kept in continual confusion.

I repeat, therefore, Teach but one thing at a time, and be sure that that one thing be learned before another is attempted. If by mistake the scholar is found to have passed some essential point without learning it, he should be put back to it again and be made to learn it; but on no account should he try to learn it by reference. When such a case has taken place, the scholar will show it by failing to get his lessons, by getting into difficulties too often, and requiring too many explanations. If it cannot readily be discovered what it is that he has neglected, he should be examined backward, until a place is found where he meets with no difficulty, and then let him proceed from that. But it is by far the best way that the scholar should be made thorough as he goes, and it is the only way to be successful. It is also the easiest and most expeditious.

By teaching one thing at a time I would not be understood to mean that the scholar should not study different subjects on the same day. It is necessary for most scholars to be attending to several subjects at the same time; for young persons cannot well be made to apply themselves to the same thing long at a time. A change, therefore, is necessary as a relief to the mind, and a judicious teacher will not keep his pupils upon any one exercise longer than he can keep their attention upon it.

Whatever subject you are teaching, keep this precept in view: to teach only one point of it at once, and apply yourself strictly to that, until the learner is master of it, and then give him another. Be careful, in the selection, to choose the easiest first, and then the next easiest, and so on. And where one thing depends on another, make them follow each other as much as possible in the order of dependence. You cannot always decide, by your own judgment, what is the easiest. This must be discovered by trial on the scholars. It will often be found that the thing which one scholar will learn the easiest first will not be the same for another. Also, what is easiest with one teacher will not always be so with another. Each teacher should satisfy himself, by experiment, what order he succeeds best with, and then pursue it as nearly as he can, varying only when the learner requires it. It is not always necessary to pursue the precise order of the textbook. The order of the book should be followed in preference to any other, unless the teacher feels very sure that some other order succeeds better with him.

The learner should never be told directly how to perform any operation in arithmetic. Much less should he have the operation performed for him. I know it is generally much easier for the teacher, when a scholar finds a question a little too difficult and comes for assistance, either to solve the question for him, or tell him directly how to do it. In the old method this generally was done. Not infrequently the teacher took the question and solved it at home in the evening if he could and gave the scholar the solution the next day to copy into his book. Now by this generally no effect was produced on the scholar, except admiration of the *master's* skill in *ciphering*. He himself was none the wiser for it.

If the learner meets with a difficulty, the teacher, instead of telling him directly how to go on, should examine him and endeavor to discover in what the difficulty consists; and then, if possible, remove it. Perhaps he does not fully understand the question. Then it should be explained to him. Perhaps it depends on some former principle which he has learned but does not readily call to mind. Then he should be put in mind of it. Perhaps it is a little too difficult. Then it should be simplified. This may be done by substituting smaller numbers, or by separating it into parts and making a distinct question of each of the parts. Suppose the question were this: *If 8 men can do a piece of work in 12 days, how long would it take 15 men to do it?* It might be simplified by putting in smaller numbers, thus: *If 2 men can do a piece of work in 3 days, how long would it take 5 men to do it?* If this should still be found too difficult, say, *If 2 men can do a piece of work in 3 days, how long will it take 1 man to do it?* This being answered, say, *If 1 man will do it in 6 days, how long will it take 3 men to do it? In what time would 4 men do it? In what time would five men do it?* By degrees, in some such way as this, lead him to the original question. Some mode of this kind should always be practiced; and by no means should the learner be told directly how to do it, for then the question is lost to him. For when the question is thus solved for him, he is perfectly satisfied with it, and he will give himself no further trouble about the mode in which it is done.

When the learner begins to require assistance too often, it is an indication that something has not been learned thoroughly. He should then go back to some place that he does perfectly understand, and review.

All illustrations should be given by practical examples having reference to sensible objects. Most people use the reverse of this principle and think to simplify practical examples by means of abstract ones. For instance, if you propose to a child this simple question: *George had five cents, and his father gave him three more, how many had he then?* I have found that most persons think to simplify such practical examples by putting them into an abstract form and saying, *How many are five and three?* But this question is already in the simplest form that it can be. The only way that it can be made easier is to put it in smaller numbers. If the child can count, this will hardly be necessary. No explanation more simple than the question itself can be given, and none is required. The reference to sensible objects, and to the action of giving, assists the mind of the child in thinking of it, and suggests immediately what operation he must perform; and he sets himself to calculate it. He has not yet learned what the sum of those two numbers is; he is therefore obliged to calculate it in order to answer the question; and he will require some little time to do it. Most persons, when such a question is proposed, do not observe the process going on in the child's mind; but because he does not answer immediately, they think that he does not understand it, and they begin to assist him, as they suppose, and say, How many are five and three ? Cannot you tell how many five and three are ? Now this latter question is very much more difficult for the child than the original one. Besides, the child would not probably perceive any connection between them. He can very easily understand, and the question itself suggests it to him better than any explanation, that the five cents and three cents are to be counted together; but he does not easily perceive what the abstract numbers five and three have to do with it. This is a process of generalization which it takes children some time to learn.

In all cases, then, especially in the early stages, it will be perplexing and rather injurious to refer the learner from a practical to an abstract question for the purpose of explanation. And it is still worse to tell him the result, and not make him find it himself. If the question is sufficiently simple, he will solve it. And he should be allowed time to do it and not be perplexed with questions or interruptions until he has done it. But if he does not solve the question, it will be because he does not fully comprehend it. And if he cannot be made to comprehend it, the question should be varied, either by varying the numbers, or the objects, or both, until a question is made that he can answer. One being found that he can answer, another should be made a little varied, and then another, and so on, till he is brought back to the one first proposed. It will be better that the question remain unanswered than that the child be told the answer, or assisted in the operation any further than may be necessary to make him fully understand the question.

Some children, when a question is proposed, instead of thinking of it, and trying to solve it, will endeavor to guess at the result. This should be checked immediately.

It has often been asked whether the plates which sometimes accompany Colburn's *Intellectual Arithmetic*, or anything else of a similar nature, are of any use to the learner. I think myself that they have very little effect upon his progress. At first, before he is familiar with the addition and multiplication tables, some kind of counters seem to be necessary; but it is not important what they are. The plates are very convenient, but I believe the fingers do about as well as anything. If the scholar is allowed any helps of this kind, he should be left to manage them entirely by himself, and in his own way. Any helps by which the work is partly done for the scholar are certainly injurious. It is by his own efforts, that a child is to learn if he learns at all. The teacher cannot learn for him. Neither will he labor himself, if the teacher will endeavor to do the work for him. You might, with as much propriety, expect that his muscles would be strengthened by seeing others exercise in the gymnasium as to expect a child's mind to be strengthened and improved when the teacher does the work for him. The teacher may assist him in understanding the question, but not in the operation—not even in arranging his counters; for to do this, is to do for him the most important part of the solution.

It is best that the learner should be exercised for some time in solving practical questions involving addition and multiplication before he commits to memory the addition and multiplication tables. He should understand the use of them, and be able to make them, before he is required to learn them, and then he should be made to learn them thoroughly. It is not well for a child to commit anything to memory that he does not understand, for he thereby acquires a habit of repeating it without attending to the sense; and it is more difficult to make him attend to the sense afterward, when he repeats it, than if he had not seen it before. At least, this is generally the case. There may be exceptions. I might refer again to the subject of grammar as furnishing the most familiar instance of this. For example, it is very easy for a scholar, when properly taught, to learn the distinction of cases in the pronouns. And yet I have had scholars who had learned their grammar before they came under my care, so as to repeat it by heart, in parsing the word *him*, call it in the nominative case; and still persist in calling it so, after being required to decline it five or six times in succession. Arithmetic, or any other subject, would furnish examples enough of the difficulty of making the scholars attend to the sense sufficiently to understand a rule or principle when they have first committed it without understanding it. But grammar, perhaps, affords the most striking instances of it.

I shall now endeavor to explain a principle which I consider to be a very important one. It is one less generally understood than any that I have mentioned or shall mention. Many teachers have practiced upon it very well without having particularly thought of it. Many of you, I presume, have both thought of it and practiced upon it. But there are many who do not observe it, either in theory or practice. This principle depends on the association of ideas. I shall not enter here into a discussion of the principle of association. I leave it to the metaphysician to determine whether there are any general laws which regulate it or not. I shall confine myself to one simple matter of fact concerning it and the practical consequences to be derived from it.

The fact is this, that two persons never have exactly the same associations of ideas. I mean, they never associate their ideas in exactly the same order. The consequence is that no two persons think of the same proposition alike. Hence a proposition expressed in certain terms may be very clear and intelligible to one person and very obscure or altogether unintelligible to another. And perhaps, with a very slight change of terms, the case would be entirely changed. It would be intelligible to the latter and unintelligible to the former. An explanation which is very clear and lucid to one will often convey no idea at all to another. When a proposition is made for two persons to reason upon, they will often take it up and manage it very differently in their minds. When the subject is such as to admit of demonstration, as is the case with mathematics, they will generally come to the same conclusions. But on other subjects their conclusions will sometimes agree and sometimes not.

There are several practical results to be derived from this. First, it is very important that a teacher should be able readily to trace, not only his own associations, but those of all his pupils, when he hears them recite their lessons. When a proposition or question is made to a scholar, he ought to be able to discover at once whether the scholar understands it or not. If he does not understand it, the teacher should be able to discover the reason why, and then he can apply the remedy. This is to be done only by questioning the scholar, and tracing his associations, and finding what he is thinking about, and how he is thinking about it. Without doing this, the teacher is as likely to perplex the scholar as to assist him by his explanations. And it is a very common thing to see scholars perplexed in this way.

Secondly, when the scholar does not understand the question or proposition, he should be allowed to reason upon it in his own way, and agreeably to his own associations. Whether his way is the best or not, on the whole, it is the best way for him at first, and he ought by no means to be interrupted in it or forced out of it. The judicious teacher will leave him to manage it entirely by himself, and in his own way, if he can. Or if he meets with a little difficulty, but is still in a way that will lead to a proper result, he will apply his aid so as to keep him in his own way. When the scholar has been through the process in his own way, he should be made to explain how he has done it; and if he has not proceeded by the best way, he should be led by degrees into the best way. Many teachers seem not to know that there is more than one way to do a thing, or think of a thing; and if they find a scholar pursuing a method different from their own, they suppose of course he must be wrong, and they check him at once, and endeavor to force him into their way, whether he understands it or not. If such teachers would have patience to listen to their scholars and examine their operations, they would frequently discover very good ways that had never occurred to them before. Nothing is more discouraging to scholars than to interrupt them when they are proceeding by a method which they perfectly comprehend, and which they know to be right; and to endeavor to force them into one which they do not understand, and which is not agreeable to their way of thinking. And nothing gives scholars so much confidence in their own powers and stimulates them so much to use their own efforts as to allow them to pursue their own methods and to encourage them in them.

It is very important for teachers to lead their scholars into the habit of attending to the process going on in their own minds while solving questions, and of explaining how they solve them. Unless the teacher possesses the faculty of tracing the associations of others, he cannot make them do it effectually. But the teacher who does possess this faculty perfectly will get an explanation out of anybody that has any thoughts and can be made to speak on the subject upon which he is questioned. He can take one of his scholars, or any other person, and make him trace out and explain a process of reasoning which has passed in his mind, but of which he was not at all aware, and concerning which, if left to himself, he could give no account. He seems to have the thoughts of his scholars under his control. He will not only find out *what* they are thinking about, and *how* they are thinking of it, but he is able to turn their thoughts into almost any channel he pleases. And it is next to impossible for one person to direct the current of another's thoughts on any subject, unless he knows the channel in which they are already flowing.

This subject also suggests a hint with regard to making books, and especially those for children. The author should endeavor to instruct, by furnishing the learner with occasions for thinking and exercising his own reasoning powers, and he should not endeavor to think and reason for him. It is often very well that there should be a regular course of reasoning in the book on the subject taught; but the learner ought not to be compelled to pursue it, if it can possibly be avoided, until he has examined the subject and come to a conclusion in his own way. Then it is well for him to follow the reasoning of others, and see how they think of it.

I will now say a few words concerning recitations. They are of very great importance in instruction in a great many points of view; and it is very essential that they be well conducted. They are the principal means which the teacher has to know what progress the scholars are making. It is chiefly at recitations that one scholar can compare himself with another; consequently they furnish the most effectual means of promoting emulation. They are an excellent exercise for the scholar, for forming the habit of expressing his ideas properly and readily. The scholar will be likely to learn his lesson more thoroughly when he knows he shall be called upon to explain it. They give him an opportunity to discover whether he understands his subject fully or not, which he will not always be sure of, until he is called upon to give an account of it. Recitations in arithmetic, when properly conducted, produce a habit of quick and ready reckoning on the spur of the occasion, which can be produced in no other way except in the business of life; and then only when the business is of a kind to require constant practice. They are therefore a great help in preparing scholars for business.

Directions concerning recitations must be general. Each teacher must manage the detail of them in his own way.

In the first place, the scholar should be thoroughly prepared before he attempts to recite. No lessons should be received by the teacher that are not well learned. If this is not insisted on, the scholar will soon become careless and inattentive.

It is best that the recitations, both in intellectual and written arithmetic, should be in classes, when practicable. It is best that they should be without the book, and that the scholar should perform the examples from hearing them read by the teacher. Questions that are put out to be solved at the recitation should be solved at the recitation, and not answered from memory. The scholars should frequently be required to explain fully and clearly the steps by which they solve a question and the reasons for them. Recitations should be conducted briskly and not suffered to lag and become dull. The attention of every scholar should be kept on the subject, if possible, so that all shall hear everything that is said. For this it is necessary that the questions pass around quickly, and that no scholar be allowed a longer time to think than is absolutely necessary. If the lesson is prepared as it should be, it will not take the scholar long to give his answer. It is not well to ask one scholar too many questions at a time; for by that there is danger of losing the attention of the rest. It is a good plan, when practicable, so to manage the recitation that every scholar shall endeavor to solve each question that is proposed for solution at the time of recitation. This may sometimes be done by proposing the question without letting it be known who is to answer it until all have had time to solve it, and then calling upon someone for the answer. No further time should be allowed for the solution; but if the scholar so called on is not ready, the question should be immediately put to another in the same manner.

There is one point more which I shall urge, and it is one which I consider the most important of all. It is to make the scholars study. I can give no directions how to do it. Each teacher must do it in his own way, if he does it at all. He who succeeds in making his scholars study will succeed in making them learn, whether he does it by punishing, or hiring, or persuading, or by exciting emulation, or by making the studies so interesting that they do it for the love of it. It is useless for me to say which will produce the best effects upon the scholars; each of you may judge of that for yourselves. But this I say, that he who makes his scholars study will make them learn; and he who does not will not make them learn much or well. There never has been found a royal road to learning of any kind, and I presume there never will be. Or if there should be, I may venture to say that learning so obtained will not be worth the having. It is a law of our nature, and a wise one too, that nothing truly valuable can be obtained without labor.

There are some facilities for learning at the present day, perhaps, which were not formerly known. These serve to render study less irksome, but they do not render it less necessary. They enable the scholar to obtain more knowledge with an equal quantity of labor, but they do not enable him to obtain any valuable knowledge without labor. If scholars were to learn wholly by the assistance of the teacher, without any efforts of their own, they would acquire habits of idleness and inactivity which would be more injurious to them than their learning would be beneficial; and they would be little able to make any progress in learning after leaving school. But the scholar who is made to apply himself closely, and to learn by his own efforts, acquires habits of diligence and perseverance which will be useful to him through life. And he learns (which is of more advantage than the immediate subject of his studies) how to learn by his own efforts, without the aid of a teacher.

I have now briefly noticed what I consider the essential points to be attended to in teaching arithmetic. Many of them, as I observed before, are not peculiar to arithmetic but apply equally to all subjects. And I dare say you will hear some of them much more ably discussed during the course. But there are many essential points of a good instructor that cannot be taught by lecture. This I will not undertake to describe. One point more, however, I will remark: that to teach a subject well, it is necessary for the teacher to understand it well himself, and to take an interest in it; otherwise he will not make it interesting to his scholars.

Allow me to close with a few remarks, expressing, though imperfectly, the interest I feel in the occasion that has brought us together. There have been, in every age, a few persons who have felt the importance of the subject of education. But generally the numbers have been few. The business of teaching, except in great seminaries, has not been considered as one of the most honorable occupations, but rather degraded; so that few persons of talents would engage in it. Even in our own country and age, it has been too much the case that persons with a little learning, and unwilling to work and unfit for anything else, have turned schoolmasters, and have been encouraged in it. They have been encouraged in it because the pay of school teachers, in most instances, has been just sufficient to obtain that class of persons, and no other but one, which, with few exceptions, is not much better. I mean such as engage in the business of teaching for a short time, in order to discharge a few debts previous to entering on a profession.

But a new era, I trust, is now opened upon us. The community at large is beginning to feel the importance of the subject, and to show an interest in it. The fact of there being so many persons, both teachers and others, and many of them from distant parts of the country, collected here on this occasion, is a sufficient proof that the interest is neither small nor confined to one section of the country. A few years ago it would have been impossible to assemble such a number of persons for such a purpose. It seems now to be generally agreed that the business of teaching ought to be considered as a profession; and that the persons engaging in it ought to be instructed expressly for it, as for a profession. And institutions are getting up for that purpose. Your assembling here in this way, for mutual instruction on this important subject, though it will not supply the place of regular institutions for it, will greatly promote the general object and hasten on the period of their adoption. I rejoice, therefore, to see this meeting. Though at present engaged in a pursuit very different from yours, I cheerfully accepted the proposals to deliver a lecture before you; not because I felt that I could do the subject justice, but because I was glad of the opportunity of contributing my mite, however small, to the promotion of so great a cause. I hope, therefore, that you will improve the opportunity you now have of receiving and communicating information, and that you will lay the foundation of a great work of which not only your own immediate neighborhoods, but our country at large, and not our country only, but the whole world, shall feel the influence.